Claims

1. (amended) A single-type optical isolator characterized by having a magnetic optical element constituted of i) a Faraday rotator on each side of which an anti-reflection film has been formed and ii) a polarizer comprising photonic crystals which has been formed on one anti-reflection film of the former; and a glass polarizer so disposed as to be set opposite to the anti-reflection film of the Faraday rotator in the magnetic optical element on its side where the photonic crystals are not formed.

2. (amended) A broadband semidouble-type optical isolator characterized by having a one-sheet glass polarizer; and a pair of magnetic optical elements which are each constituted of i) a Faraday rotator on each side of which an anti-reflection film has been formed and ii) a polarizer comprising photonic crystals which has been formed on one anti-reflection film of the former, and are respectively laminated to the glass polarizer on its inside and outside in such a way that each polarizer comprising photonic crystals is provided on the outside.

3. (amended) The optical isolator according to

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claim 1 or 2, wherein said photonic crystals are those obtained by alternately layering transparent high refractive index and low refractive index mediums on rows of periodic grooves or linear projections while keeping the shape of interfaces.

4. (amended) The optical isolator according to claim 1 or 2, wherein said photonic crystals are those obtained by forming periodic grooves by lithography.

5. (amended) The optical isolator according to any one of claims 1 to 4, wherein an anti-reflection film has been formed on the surface of the polarizer comprising photonic crystals.

6. (amended) The optical isolator according to any one of claims 1 to 5, wherein the outermost layer of said anti-reflection film on which the polarizer comprising photonic crystals is formed is an SiO_2 layer.

7. (deleted)

8. (deleted)

9. (amended) A single-type optical isolator characterized by being constituted chiefly of a

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substrate for placing thereon an optical isolator; a magnetic optical element disposed on the substrate and constituted of i) a Faraday rotator on each side of which an anti-reflection film has been formed and ii) a polarizer comprising photonic crystals which has been formed on one anti-reflection film of the former; a glass polarizer so disposed on the substrate as to be set opposite to the anti-reflection film of the Faraday rotator in the magnetic optical element on its side where the photonic crystals are not formed; and a magnet which imparts a saturated magnetic field to the Faraday rotator in the magnetic optical element.

10. (amended) A single-type optical isolator characterized by being constituted chiefly of a sectionally U-shaped magnet; a magnetic optical element disposed inside the U-portion of the substrate and constituted of i) a Faraday rotator on each side of which an anti-reflection film has been formed and ii) a polarizer comprising photonic crystals which has been formed on one anti-reflection film of the former; and a glass polarizer so disposed inside the U-portion of the substrate as to be set opposite to the anti-reflection film of the Faraday rotator in the magnetic optical element on its side where the photonic crystals are not formed.

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11. (amended) A broadband semidouble-type optical isolator characterized by being constituted chiefly of a substrate for placing thereon an optical isolator; a one-sheet glass polarizer disposed on the substrate; a pair of magnetic optical elements which are each constituted of i) a Faraday rotator on each side of which an anti-reflection film has been formed and ii) a polarizer comprising photonic crystals which has been formed on one anti-reflection film of the former, and are respectively laminated to the glass polarizer on its inside and outside in such a way that each polarizer comprising photonic crystals is provided on the outside; and a magnet which imparts a saturated magnetic field to each Faraday rotator of the magnetic optical elements.

12. (amended) A broadband semidouble-type optical isolator characterized by being constituted chiefly of a sectionally U-shaped magnet; a one-sheet glass polarizer disposed inside the U-portion of the substrate; and a pair of magnetic optical elements disposed inside the U-portion of the substrate which are each constituted of i) a Faraday rotator on each side of which an anti-reflection film has been formed and ii) a polarizer comprising photonic crystals which has been formed on one anti-reflection film of the

former, and are respectively laminated to the glass polarizer on its inside and outside in such a way that each polarizer comprising photonic crystals is provided on the outside.

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STATEMENT UNDER ARTICLE 19(1) OF THE TREATY

Claims 1 and 2 have clarified that a glass polarizer is combined with the magnetic optical element according to claims 1 and 2 before amendment to constitute a single-type optical isolator and a broadband semidouble-type optical isolator, respectively.

Each reference cited has no disclosure at all as to the single-type optical isolator and broadband semidouble-type optical isolator in which the magnetic optical element constituted of i) a Faraday rotator on each side of which an anti-reflection film has been formed and ii) a polarizer comprising photonic crystals which has been formed on one anti-reflection film of the former and the glass polarizer are set in combination.

Then, the single-type optical isolator and broadband semidouble-type optical isolator according to the present invention are each constituted of the magnetic optical element and the glass polarizer in combination, and the glass polarizer is an absorption type polarizer. Hence, any unnecessary light is absorbed and intercepted even when this glass polarizer is disposed on the side of a semiconductor laser element or on the opposite side thereof, e.g.,

on the side of an optical fiber. This brings the effect of surely preventing the difficulty that the lasing of lasers comes unstable, caused by the reflection return light.